Title of the course:

Modern Dual-polarization Radar Networks: Design, Deployment Considerations, and Enhanced Applications

Duration: Half Day

Availability to have on-line attendees: No

Presenter's name: Renzo Bechini (1), Roberto Cremonini (1), V. Chandrasekar (2)
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Abstract (flexible number of characters. Preferred less than 1000 characters (space included):

Traditionally, radar systems were deployed independently, needing more consideration and coordination with other units. The best that was accomplished was a mosaic of different radar observations. However, with the ubiquitous availability of the internet, seamless interconnectivity became feasible, ushering in a new era of radar networking exemplified by initiatives like the CASA network of X-band systems, or a hybrid network of multi-band radar systems being introduced all over the world, especially in urban regions, or complex terrain.

Currently, radar networks are intentionally designed and deployed as cohesive networked units rather than disparate entities tethered together. These networks have evolved from basic data-push setups, which merely provided supplementary coverage, to sophisticated data-pull systems. In these systems, each radar contributes to a collective operational strategy, with observations from one radar informing the operations of others. This network based thinking has also altered the basics of the radar equation.

This course will describe the basics of network thinking, various network architectures, focusing on the intricacies of designing radar networks from the ground up. Key considerations include network topologies, calibration procedures, and the impact on sensitivity and the radar equation itself. Radar networks offer substantial advancements in crucial applications like rainfall estimation and attenuation correction, which will be shown through practical examples. Additionally, challenges specific to network deployment in complex terrain will be addressed with real-world case studies.

This course, while geared toward agency managers interested in modernizing or deploying new networks, will also be useful to a new class of students and radar system managers, who consider networks from the beginning. This changes the radar design into an economic optimization problem, and not a simple design problem. This course aims to provide comprehensive insights into radar network development, featuring tutorial workbooks on network design examples.
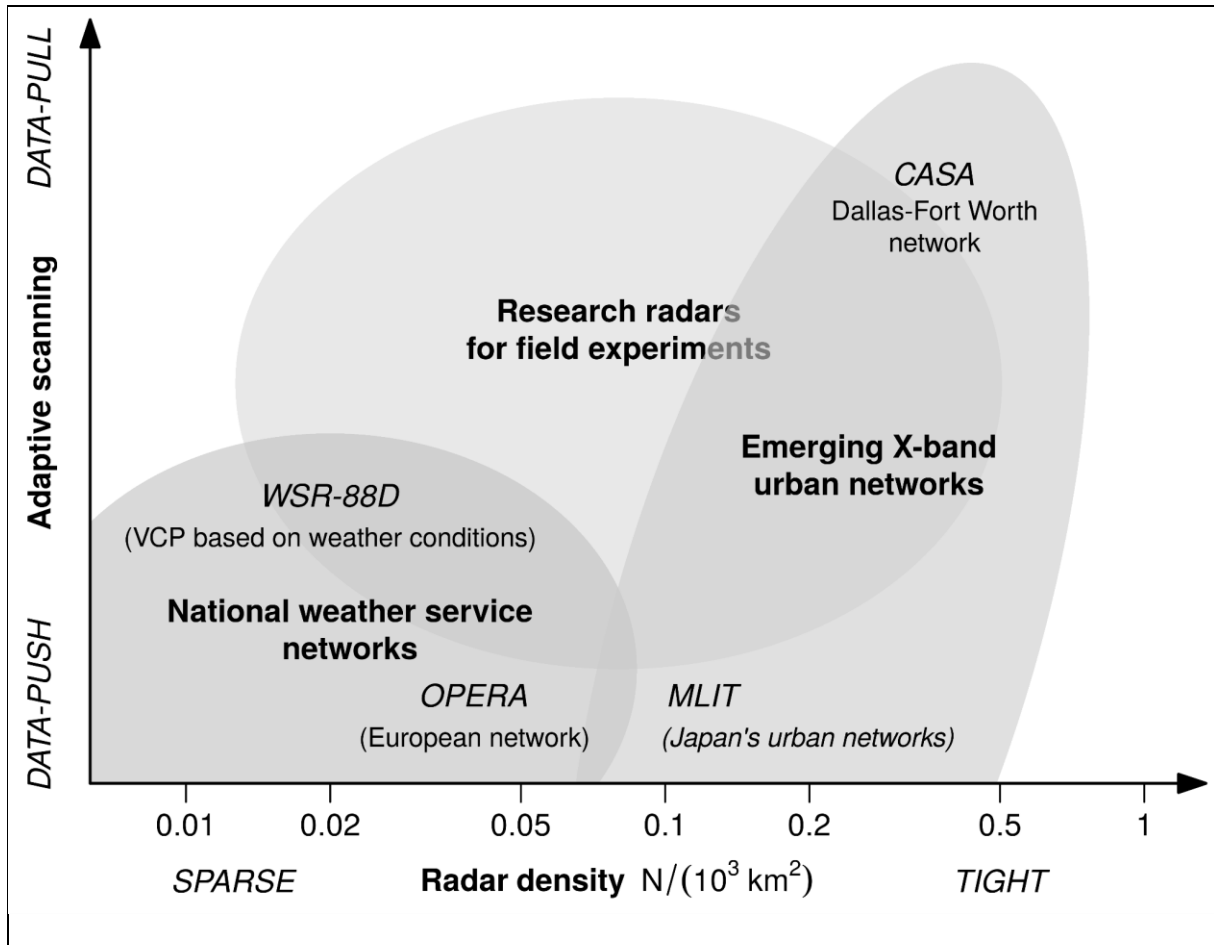
Goals of the course (what learners are expected to achieve, few lines are enough):

Participants will gain insight into various architectures utilized in weather radar networks, acquire essential principles for designing a modern radar network, and learn strategies to optimize network operations tailored to its specific objectives.

Expected background of trainees (background knowledge, technology competencies, material/readings that you want to share/suggest with students in advance)):

Basic knowledge of weather radar principles and systems operation.